Appendix E

Aerial Spray Recommendations and Spray Dispersion Model Predictions

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The following is taken from Appendix F of the Lolo National Forest Big Game Winter Range and Burned Area Weed Management Final EIS (2001c). These aerial spray recommendations and dispersion models were developed for the Lolo National Forest in western Montana and are appropriate as examples for possible application on the Salmon-Challis National Forest.

Aerial Spray Recommendations

The treatment block should be marked with flagging to mark the block corners or clearly described and reviewed with applicator. It would be desirable to have a GPS system on board to record helicopter swaths, position, and boom on and off times and location.

In canyon areas, winds should follow the typical diurnal pattern of upslope during the day and down slope during the night. Canyon winds are those that move up or down the canyon; slope winds are those that move up or down the slope. These diurnal winds result from heating and cooling of the surface. Clear skies with solar radiation reaching the surface during the day cause up canyon and upslope winds. Cooling that occurs after sunset generates upslope or drainage winds. Given that waterways/riparian areas are often located in the bottom of canyon areas, it is essential to avoid drift down canyon and downslope. Down canyon and downslope winds will likely occur on clear days following daytime hours. To prevent spray from drifting down canyon/downslope, winds should be up canyon and upslope. This can be attained by taking the following steps:

- Spray in the morning when up canyon and upslope winds are well established and blowing up canyon. The specific time will need to be determined by real-time weather monitoring.
- Maintain a low boom pressure.
- Monitor spray pressure during flight, since changes in pressure can change the application rates and may change the drop size.
- Check nozzles and review calibration with pilot.
- Begin the first swath 300 feet from any sensitive area.
- Mark boundaries so they are clearly understood by the pilot.
- Treatment boundaries next to sensitive areas may be monitored with spray deposit cards to detect any possible drift.

- Monitor and record weather in the area. The weather should be monitored in real time for operational control and to help with the post-spray analysis.

FSCBG Spray Dispersion Model Predictions

FSCBG model predictions were conducted by Pat Skyler, FPM Pesticide Application Group, Davis, CA to assist in developing aerial spray strategies for proposed herbicide applications to control noxious weeds on the Lolo National Forest. The predictions can be used to do the following:

- Plan operational methodologies.
- Determine size of buffer strips to prevent or minimize sensitive area contamination
- Decide under which wind and other atmospheric conditions to conduct aerial spraying

Three commonly used aircrafts in Western Montana are the: Bell 47 Soloy, Bell 206BIII, and Hiller 12E. Table E-1, 2, and 3 lists the FSCBG model inputs.

TABLE E-1
Spray Conditions—FSCBG Model Inputs for Hiller 12E

Release Height	10 and 25 Feet Above Ground
Operating Speed	40 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	40 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-8.70 feet
Nozzle Type and Orientation	CP/0 degrees
Number of Nozzles	29
Rotor Diameter	35.43 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

TABLE E-2
Spray Conditions—FSCBG Model Inputs for Bell 206BIII

Release Height	10 and 25 Feet Above Ground
Operating Speed	80 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	45 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-9.01 feet
Nozzle Type and Orientation	TeeJet D4-46/0 degrees
Number of Nozzles	35
Rotor Diameter	33.37 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

TABLE E-3
Spray Conditions—FSCBG Model Inputs for Bell 47 Soloy

Release Height	10 and 25 Feet Above Ground
Operating Speed	50 mph
Formulation	Tordon/Picloram
Application Rate	2 gal/acre
Swath Width	45 feet
Temperature	70 deg. F.
Relative Humidity	60%
Wind Speed	6 mph
Nozzle Vertical Distance	-8.07 feet
Nozzle Type and Orientation	D8 Jet/45 degrees
Number of Nozzles	16
Rotor Diameter	37.17 feet
Nozzles	Evenly spaced over 100% of the boom
Wind Directions	Crosswind, 45 degrees and 85 degrees (where the direction of a north wind is 0 degrees)

The entire modeling report is one file at the Lolo National Forest. The three FSCBG models ran different inputs for operating (flight) speed, nozzle type, orientation, and number, and swath and rotor widths. Under these three scenarios, the models demonstrate that 1) the direction of off-target deposition can be managed by monitoring the winds and conducting spray operations under conditions that will carry the spray away from the buffer area and onto the spray block; and 2) even when spraying under a 6-mph crosswind of 45 and 85 degrees, there is essentially no deposition within a 300-foot-wide buffer zone.

The entire modeling report is on file at the Lolo NF. Modeling runs clearly demonstrate that:

- Most of the spray is deposited in the treatment block regardless of wind direction
- Direction of off-target deposition can be managed by monitoring the winds and conducting spray operations under conditions that will carry the spray away from the sensitive areas and into the spray block.
- Even when spraying under a crosswind and directions of 45 and 85 degrees, there would be essentially no deposition in the sensitive areas with a buffer of 300 feet.
- However, there would be no applications in these crosswind situations.